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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,624	11/21/2003	Richard Ulyott	2993-484US CMB/al	8610
32292	7590	11/13/2006	EXAMINER	
OGILVY RENAULT LLP (PWC) 1981 MCGILL COLLEGE AVENUE SUITE 1600 MONTREAL, QC H3A 2Y3 CANADA			KIM, TAE JUN	
			ART UNIT	PAPER NUMBER
			3746	

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,624	ULLYOTT, RICHARD	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12-17 and 19-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-17 and 19-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant admits in the response to arguments that one of ordinary skill in the art would recognize that application of PWM to tip control means will not work. Hence, applicant's statement tantamount to an admission that this own device will not work.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redinger, Jr. et al (4,069,662) in view of any of Falk (3,421,318),

McArthur (6,209,309) and Nystrom (3,999,388). Redinger, Jr et al teach in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling a first portion of cooling air (e.g. upstream sections 36 in Fig. 4) admitted directly to said turbine shroud area by adjusting a duty cycle of a modulating signal according to said cooling air requirement (col. 4, lines 12+) by diverting a second portion of said cooling air (downstream sections 36 in Fig. 4) to other components of the gas turbine engine; a valve 44 controlling an air passage for said cooling air and wherein said controlling a first portion of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. As for said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start; take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed cruise, high speed cruise, reverse thrust, climb and descent, applicant lists all the known operating conditions of the engine, and the control signal will inherently be taken at one of these operation conditions, note the system is not turned on when on the ground (col. 4, lines 40+). Redinger, Jr et al

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teach various aspects of the claimed invention including modulating the on-off valve but does not specifically teach a PWM valve. Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

5. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franconi et al (6,910,851) in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). Franconi et al teach in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling a first portion of cooling air (e.g. flow from 318 to the high pressure turbine shroud, see col. 7, lines 46+) admitted directly to said turbine shroud area by adjusting a modulating signal according to said cooling air requirement (col. 7, lines 62+) and

diverting a second portion (e.g. flow in 320 to the low pressure section) of said cooling air to other components of the gas turbine engine; a valve 302 controlling an air passage for said cooling air and wherein said controlling a first portion of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit 354 uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode; said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start, take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed cruise, high speed cruise, reverse thrust, climb and descent (see col. 7, lines 62+; col. 8, lines 4+). The valve is a solenoid valve and as such would appear to inherently have a duty cycle. Alternately, Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities

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and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

6. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 58-214603 in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). JP '603 teaches in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling a first portion of cooling air 16 admitted directly to said turbine shroud area via 16t-1 by adjusting a modulating signal according to said cooling air requirement and diverting a second portion of said cooling air (e.g. via 16t-2 or 16c-1, 16c-2) to other components of the gas turbine engine; a valve 16t-1, controlling an air passage for said cooling air and wherein said controlling a first portion of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit 20 uses a signal representative an operating condition of said gas turbine engine for controlling said valve; as for said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start; take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed

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cruise, high speed cruise, reverse thrust, climb and descent, applicant lists all the known operating conditions of the engine, and the control signal will inherently be taken at one of these operation conditions, note the system is not turned on when on the ground (col. 4, lines 40+).said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. The valve is a solenoid valve and as such would appear to inherently have a duty cycle. Alternately, Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

7. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al (6,925,814) in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). Wilson et al teach the claimed invention (compare

the figures with the instant applicant) including a valve 60 but with the exception of a duty controlled solenoid valve but Wilson et al do provide for the valve taking on any suitable valving scheme and its control (col. 7, lines 27+). Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164

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USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-10, 12-17, 19-22 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of U.S. Patent No. 6,925,814 in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388) and optionally further in view of Redinger, Jr. et al (4,069,662). US Patent 6,925,814 teaches all the claimed features of the invention except the valve being duty controlled solenoid valve. Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art. The

claims of the patent do not indicate how the valve is controlled. Redinger Jr. et al teach a valve 44 controlling an air passage for said cooling air and wherein said controlling a first portion of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. As for said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start; take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed cruise, high speed cruise, reverse thrust, climb and descent, applicant lists all the known operating conditions of the engine, and the control signal will inherently be taken at one of these operation conditions, note the system is not turned on when on the ground (col. 4, lines 40+). It would have been obvious to one of ordinary skill in the art to employ the control scheme of Redinger, Jr. et al in order to provide for adequate control over the turbine shroud cooling.

Response to Arguments

10. Applicant's arguments filed 05/12/2006 have been fully considered but they are not persuasive.

11. In response to applicant's argument that the art cited for PWM valves is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the PWM art is reasonably pertinent to the particular problem with which the applicant was concerned as it specifically deals with the valves chosen for use by applicant. Note that these valves have specific advantages due to its low costs and/or flow modulating abilities and/or precise metering abilities.

12. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). . The features missing in the primary references are supplied in the references citing the PWM valves, and the reasons for combining are clearly set forth above. For instance, Redinger clearly teaches using on-off modulating flow but only fails to mention the valves are PWM valves

13. Applicant's argument that using on/off modulation of the airflow of Redinger et al (page 5 of the arguments on 09/25/06, 2nd full paragraph) as teaching "the on/off or modulating type of cool air control means may operate as a function of the gap .. such a control would be **highly sophisticated and introduce complexity** (emphasis made by

applicant).” Applicant’s arguments are contradictory with the cited passage which refers to sophistication and complexity and arguing that Redinger would not want to simplify[??] his system. Furthermore, applicant misquotes the section reference. This is from col. 4, lines 15-21, **not** col. 2, lines 34-41 as applicant states. In fact, col. 2, lines 34-41 would clearly support the Examiner’s position and weakens applicant’s contention of unobviousness. Here, Redinger et al teach

“The on-off control is desirable from a standpoint of simplicity of hardware. In installations where more sophistication and complexity can be tolerated, the control can be a modulating type so that the flow of air can be modulated between full on and off to achieve a discreet thermal control resulting in a growth pattern that would give a substantially constant clearance as represented by the dash line E” (col. 2, lines 34-41), emphasis added by Examiner.

14. Hence, one of ordinary skill in the art is clearly taught that this is within the sophistication and complexity of that time, even for a reference patented in 1978.

Furthermore, the control systems available at the time applicant’s invention was made allow for far superior and complex than in 1978 due to vastly greater computing power and sophistication. Hence, applicant’s arguments are not persuasive as Redinger et al clearly would teach one of ordinary skill in the art on/off modulation of his flow.

15. Furthermore, the combination of the references clearly teach all of the claimed limitations as all flows with PWM valves have a controlled duty cycle (see e.g. col. 2, lines 51+ of Nystrom).

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax number for the organization where this application is assigned is 571-273-8300.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg, can be reached at 571-272-4828. Alternate inquiries to Technology Center 3700 can be made via 571-272-3700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you

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have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at <http://www.uspto.gov/main/patents.htm>



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